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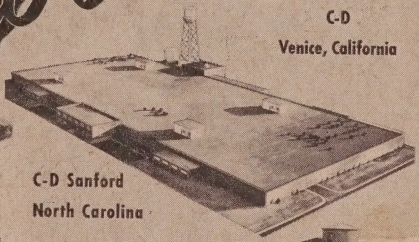

C-D Sanford
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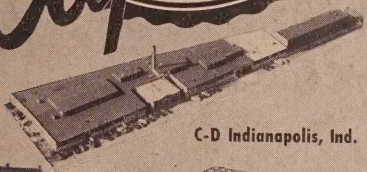

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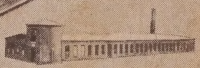

C-D Hope Valley, R.I.

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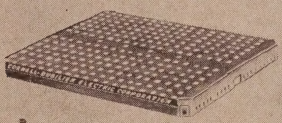

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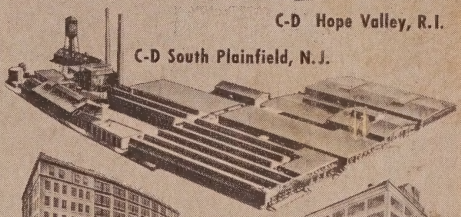

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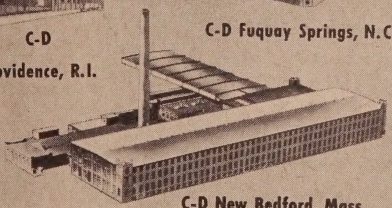

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Vol. 21 OCTOBER, 1956 No. 10

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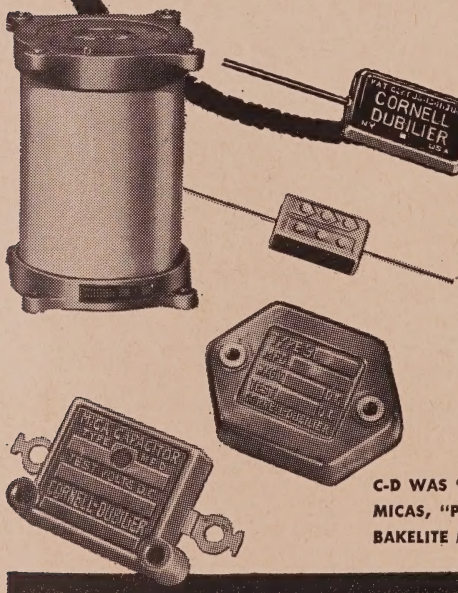

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A NEW MODULATION MONITOR

An oscilloscope ordinarily is used for amplitude-modulation measurements in the laboratory. The technique is well known and has been described, in its various phases, in earlier issues of the C-D CAPACITOR. When time does not permit the several manipulations and calculations required in the oscilloscope method, or when the modulation percentage is changing rapidly, the oscilloscope no longer is practical as a modulation monitor and the **direct-reading percent modulation meter** is demanded. Thus, the meter-type monitor is invaluable in radiotelephone stations.

Several types of modulation monitor circuits have been developed and are in wide use at this writing. Each employs some method of comparing the modulation envelope amplitude to the carrier component of the a-m wave. By making provision for setting the carrier intensity to a predetermined level, the instrument becomes direct-reading in modulation percentage while actually sampling the modulation envelope voltage.

The commercial instrument employs a diode demodulator and carrier filter followed by an audio-frequency vacuum-tube voltmeter. Various amateur instruments differ only in their use of a simple, crystal diode-type voltmeter in place of the vtvm. Also, an iron-core coupling transformer is required for voltmeter impedance matching in the amateur circuit.

Fig. 1. Completed Modulation Monitor. As shown above, the instrument is built in an 8" x 6" x 4½" aluminum chassis box. It is completely self-contained and transistorized.

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A disadvantage of the professional monitor is its significant power requirement and the necessity that it be connected to the power line. Although the amateur instrument needs no power supply, it has low sensitivity (necessitating close coupling to the transmitter under test) and requires a special coupling transformer which is not readily obtained. These factors led to the development of the instrument described in this article.

Here, an amplitude-modulated signal (Waveform A) is applied to the input terminals of the circuit by means of a coupling coil, tuned circuit, or antenna. The unilateral conductivity of the diode detector, D, results in transmission only of the positive half (Waveform B) of the modulated signal. The rectified waveform is presented to the radio-frequency filter (C_1–RFC–C_2) which removes the high-frequency carrier component but transmits the low-frequency modulation envelope (Waveform C).

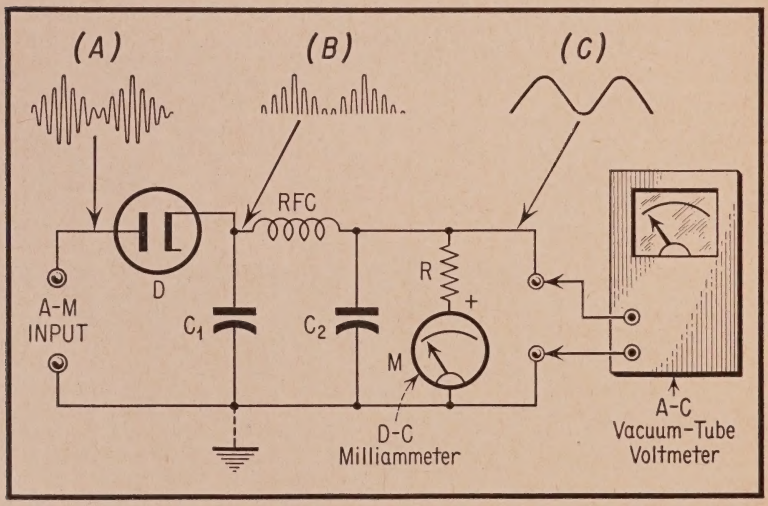


Fig. 2. Basic Circuit of Modulation Monitor.

This modulation monitor employs a crystal diode-type demodulator and a transistorized a-f voltmeter. It is entirely portable and isolated, since a single, self-contained battery supplies its small power requirement.

Operating Principle

The skeleton diagram, Figure 2, illustrates the basic operating principle of the conventional modulation monitor.

The d-c milliammeter, M, indicates the rectified component of the signal. This direct current is proportional to the average value of the carrier and does not vary during distortionless modulation in the absence of carrier shift. The modulation envelope develops an a-c voltage drop (Waveform C) across the load resistor, R. This voltage drop is indicated by the

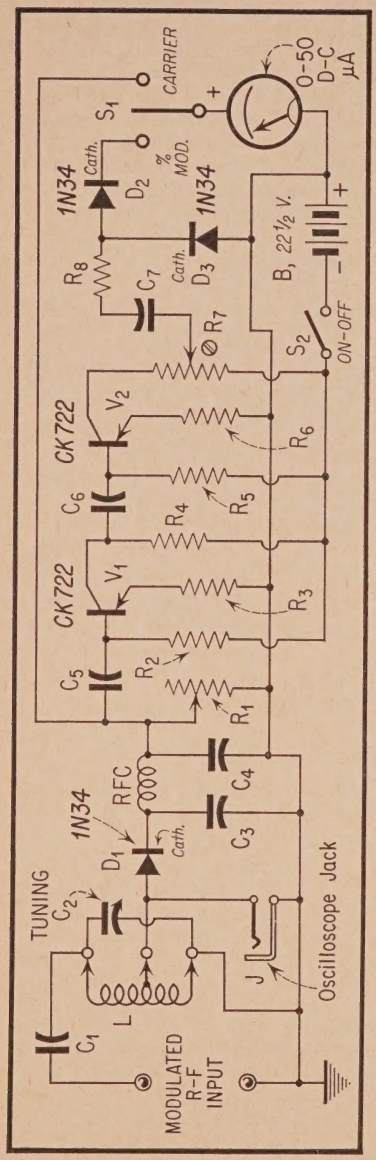


Fig. 3. Complete Circuit of Transistorized Modulation Monitor.

vacuum-tube voltmeter which must be insensitive to the r-f carrier.

The modulation factor is equal to the ratio of the peak modulating voltage (E_m) to the peak carrier voltage (E_c). At 100-percent modulation, $E_m = E_c$. In a fixed load resistance, the peak modulating current also equals the peak carrier current. Thus, if the carrier intensity (as transmitted through the monitor) always is adjusted to a predetermined level, as shown by the average carrier reading of the milliammeter, M, the vacuum-tube voltmeter deflection may be read as a certain modulation percentage and the scale of this instrument may be graduated to read directly in percent modulation.

In the instrument described in this article, the diode tube, D, has been replaced with a germanium diode and the electronic voltmeter has been transistorized for low current drain and therefore economical battery operation. The transistors employed are insensitive to radio-frequencies of the magnitude of radiotelephone carriers, so transistorization is an asset here in the design of this a-f voltmeter.

Complete Circuit

Figure 3 shows the complete circuit of the modulation monitor employing semiconductor components in each stage. The demodulator diode is D_1, the 2-stage voltmeter amplifier contains two CK722 transistors (V_1 and V_2), and diodes D_2 and D_3 form the meter rectifier.

The input system consists of coupling capacitor C_1 and the tuned circuit LC_2. Coil L is wound to resonate with C_2 (at its 75-uufd setting) at the carrier frequency. The coil is center-

tapped for a more favorable impedance match to diode D_1. The MODULATED R-F INPUT terminals may be connected to a whip antenna (with or without an external ground), or to a length of wire. The open-circuit jack, J, is provided for plugging-in the vertical amplifier input of an oscilloscope for calibration and for occasional visual observation of the modulated waveform.

The demodulator output is presented to the low-pass r-f filter (C_3–RFC–C_4) which has a cutoff frequency of approximately 150 kc. This filter is terminated with the rheostat R_1. When switch S_1 is thrown to its right (CARRIER) position, the d-c microammeter (M) is connected across R_1 and reads the rectified d-c component. Since R_1 shunts the meter in this position, it acts as a range multiplier. This rheostat accordingly is set for full-scale deflection of the meter. This is a convenient method for standardizing the carrier component in the instrument.

When switch S_1 is at its left (% MOD) setting, the meter is in the rectifier at the output of the amplifier and the a-f voltage developed across resistor R_1 is measured by the transistorized electronic voltmeter circuit. The amplifier contains two transistorized stages. Emitter resistors R_3 and R_6 are unbypassed for degeneration which increases the input resistance of the stages and linearizes response. The final collector load resistor, R_7, is employed as a gain (calibration) control for setting the sensitivity of the amplifier circuit.

The use of resistance-capacitance coupling throughout has simplified construction, increased compactness, and removed the possibility of troublesome interaction which might be encountered in transformer coupling.

Output of the amplifier is presented,

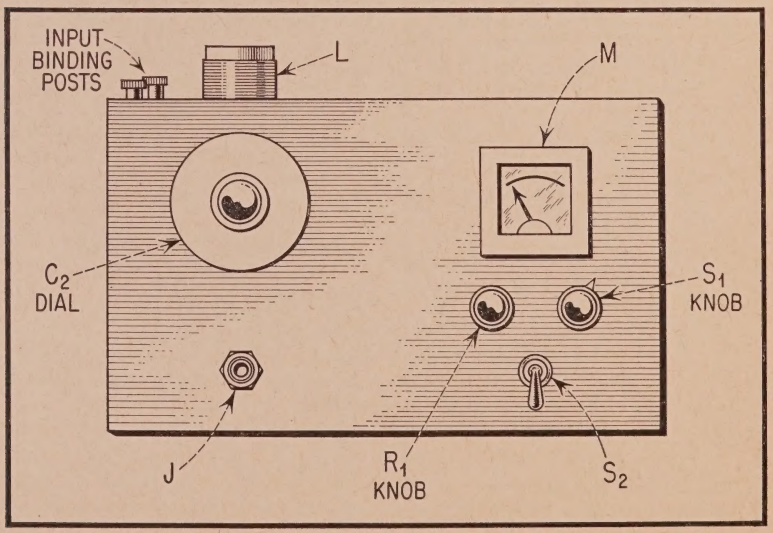


Fig. 4. Front-Panel Layout of Instrument. (Compare with Figures 1 and 3.)

by way of capacitance coupling (C_7) to the rectifier-meter circuit (R_8-D_2-D_3-M). The scale of the microammeter, M, may be graduated directly in percent modulation, as explained under **Calibration.**

This is a stable circuit having a common ground throughout. The transistors and diodes are of the inexpensive variety, and the entire instrument is readily adaptable to subminiaturization and printed circuitry.

Total current drain is 1.1 milliampere dc from the 22½-volt battery. This low power requirement of 2¼ milliwatts enables long life to be obtained with a small-sized battery. The large amount of degeneration in the transistor amplifier stages renders these stages less sensitive to variations in battery voltage occurring during the normal battery life.

Mechanical Construction

Figure 1 shows the completed modulation monitor. This version of the instrument is built in an aluminum radio chassis box: 8" long, 6" high, 4½" deep (LMB No. 146). The layout sketch, Figure 4, identifies the components seen on the front panel. Since the circuit gives no interaction trouble, a more compact assembly is possible and practical; the reader is not restricted to the editor's layout.

A 4-pin tube socket is slung under the top of the case (upper left in Figure 1) under a $1\frac{3}{8}$"-diameter clearance hole. This socket receives the plug-in coil, L. This arrangement places the coil close to the tuning capacitor, C_2, in the interest of short, direct leads. The signal-input binding posts are mounted on the left end of the top of the case.

The components of the entire detector-amplifier section (with the exception of J, R_1, S_1, S_2, M, and B) are mounted on a 4" x 6" phenolic panel. Printed circuitry can be used to advantage in this section, if desired. Potentiometer R_7 is provided with a slotted shaft for screwdriver adjustment, since this control needs only occasional adjustment.

The transistors and diodes are soldered directly into the circuit by means of their pigtail leads. During the soldering operation, however, hold the pigtail with pliers and continue to hold until the soldered joint cools. Only in this way can heat damage to the diode or transistor be prevented.

Be careful to observe the correct polarity of each diode and transistor and of the microammeter. This is an important matter, since a reversal will cause faulty operation and it also may cause transistor burnout.

The plug-in coils to cover the frequency range desired in a particular installation are wound on 1"-diameter, 4-pin phenolic forms (National XR-1). These coils may be determined (i.e., number of turns calculated) with the aid of conventional formulas or by means of the inductance slide rule.

Battery B may be held in place, by means of a strap or clips, to the floor or one wall of the metal case.

Calibration

For calibration of the monitor, an oscilloscope and an r-f signal source having amplitude modulation percentage adjustable from zero to 100 percent will be needed. The absolute value of the carrier frequency and modulation frequency is not important.

However, a convenient combination is a 2-Mc signal modulated by 400 or 1000 cycles.

Follow this calibration procedure: (1) Connect the signal source to the MODULATED R-F INPUT terminals of the instrument. (2) Connect the vertical amplifier input of the oscilloscope to jack J. (3) Throw switch S_1 to CARRIER. (4) Set rheostat R_1 to its maximum resistance position. (5) Plug-in a coil for the signal-source carrier frequency. (6) Switch-on the signal source and oscilloscope and allow an ample warm-up period. (7) Throw switch S_2 to its ON position. (8) Set the signal-source r-f output to maximum. (9) Tune-in the signal, as indicated by peak deflection of meter M. (10) Adjust R_1 for full-scale deflection of meter M. (11) Adjust the signal source modulation percentage to 100%, as measured with the oscilloscope. Readjust C_2 and R_1 if necessary. (12) Throw switch S_1 to its % MOD position. (13) Adjust potentiometer R_7 for full-scale deflection of meter M. (14) Steps 8 through 13, but omitting Step 10, may be repeated for successively lower modulation percentages (such as 90, 80, 70, 60, 50, etc.) in order to calibrate the entire scale of the microammeter, after which a special direct-reading card may be prepared for the meter.

Operation

After the instrument has been calibrated, it is used in the following manner: (1) Connect an antenna or pickup lead to the MODULATED R-F INPUT terminals. A ground may or may not help. (2) Throw switch S_1 to its CARRIER position. (3) Throw switch S_2 to ON. (4) Tune-in the signal to be measured, as indicated by peak deflection of meter M. (5) Set rheostat R_1 for full-scale deflection of the meter. (6) Throw switch S_1 to its % MOD position and read the modulation percentage direct from the meter scale. (7) When the meter switch (S_1) is in its CARRIER position, there should be no fluctuation of the deflection under modulation. Any such change in reading shows the presence of carrier shift. It may or may not be an indication of overmodulation.

PARTS LIST FOR FIGURE 3

B—Small 22½-volt battery — RCA VS102

C_1—50 uufd mica — Cornell-Dubilier 5W5Q5

C_2—150-uufd midget variable capacitor — National ST-150

C_3, C_4—0.002 ufd mica — Cornell-Dubilier 1W5D2

C_5, C_6, C_7—1.0 ufd 200 v tubular — Cornell-Dubilier CUB 2W1

D_1, D_2, D_3, D_4—General-purpose germanium diodes — Sylvania 1N34

J—Midget, open-circuit phone jack

L—Tuning coil (See Text)

M—0-50 d-c microammeter — Triplett 327-T

R_1—200-ohm wirewound potentiometer

R_2—1 megohm ½ watt carbon

R_3—1000 ohms ½ watt carbon

R_4—36K ½ watt carbon

R_5—1 megohm ½ watt carbon

R_6—1000 ohms ½ watt carbon

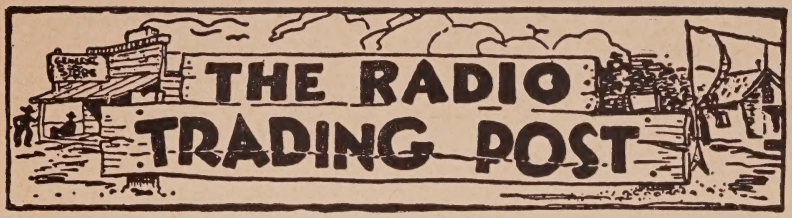
R_7—20K wirewound potentiometer

R_8—8.2K ½ watt carbon

RFC—2½ millihenry r-f choke — National R100

S_1—Spdt tone control-type wafer switch — Centralab 1460

V_1, V_2—PNP audio-type transistors — Raytheon CK722



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SELL OR TRADE — 1955-56 push-button Chevrolet radio, like new (retail value $90). Trade for 30-50 mc or 152-162 mc receiver. Paul E. Campbell, 808 North 13½ St., Terre Haute, Ind.

POSITION DESIRED — Exp. 1st phone man wishes employment as xmtr man or straight engineer, no announcing or DJ work. Gene Mick, 2317 Stanwood, Philadelphia 15, Pa.

FOR SALE — 12 w. speech amplifier with clipper circuit; Handbook Design; 20-meter exciter with built-in VFO; antenna relay, matched Class B transformers; Heathkit VTVM; two 450 mill chokes. Frank J. Kern, 50 Shelburne Road, Springfield, Delaware County, Pa.

WANTED — Generator GN-50-A. (6.6/500 v DC unit) or armature for this surplus unit. Unit is a part of PE 162-B gas-engine-driven power supply. Frank E. Johnson, 1403 San Bruno Ave., San Francisco 10, Calif.

FOR SALE — VM710 tape recorder sealed in orig. box, unused $130 FOB. Roy A. Ammering, 593 Gallup Rd., Spencerport, N. Y.

FOR SALE — Gonset tri-band converter, $20; 10-meter mobile antenna, $8.50. Both for $25. Milo G. Burston, 320 Tawas St., Alpena, Mich.

NEEDED — For fire alarm system, small thermostatic switches, NC, adjustable to open between 70-90° C. Cash or swap good relays, tubes, tube sockets, various plugs and connectors. R. Zapolin, Rt. 1, Mahopac, N. Y.

SELL OR TRADE — GE portable, model 250; LF diathermy machine; car radios; xtals, tubes, meters. Want modulation 250 w. transformer; tape recorder. Don B. Morris, 1111 Alexander Pl., Fairmont, W. Va.

WANTED — All types military electronics equip.: ARC-3, ARC-1, ART-13, BC-312, BC-342, BC-788, etc., advise price and condition. James Spivey, 4908 Hampden Lane, Bethesda, Md.

FOR SALE — Back issues of IRE Proc., Tele-Tech, Elec. Engr., Radio-TV News, QST, technical books. Send for list. W. Skalski, 280 Carlton Ave., East Rutherford, N. J.

FOR SALE — Used Magnecorder 15" and 7½" ips hysteresis synchronous motor, like new. Write Sonocraft, 115 W. 45th St., New York, N. Y.

FOR SALE — Sams Photofacts bound volumes 5 thru 16, includes sets 40 to 160, like new, $100; RCA voltohmyst WV97A, like new, $45. E. F. Cavallo, 222 Jersey St., Buffalo, N. Y.

FOR SALE — Philco 46-132 (5-tube) table model batt. radio in exc. cond., requires 1½ v. A battery and 90 v. B battery. Ideal for rural use, $10 FOB. William A. Thoma, 139 South Delmar Avenue, Dayton 3, Ohio.

TRADE — For ham gear, Bendix MRT-3 mobile FM transceivers, 157.53 mc; MRT-1E FM transceiver with AC power supply and remote control unit and cabinet, 152.27 mc. Emil Kalar, Box 221, South International Falls, Minn.

FOR SALE — Eico 320 sig. gen., factory wired, 150 kc to 34 mc, like new, with instruction book, $30; also Knight resistance substitution box (not a kit), $7. Daniel Seidler, 4216 South Washtenaw, Chicago 32, Ill.

SWAP — Q-5'er with self-contained power supply. Need Balun coils or Matchbox. Alan Finkel, 14 North Ave., Elizabeth, N. J.

SELL OR TRADE — Photo equip.: 48,000 feet of safety movie 35 mm film and Acme 1000 w. projector; also radios, tubes. Want good tape recorder. P. Calderaro, 594 Main, Wakefield, Mass.

FOR SALE — Riders 1 to 5 abridged, and 6 to 14 inclusive. Make offer. Russ Elenbaas, 2248 Horton Ave., SE, Grand Rapids 7, Mich.

SELL OR SWAP — Almost complete run of QST from 1932; CQ from 1950; older issues of radio and photography mags. Will swap for Lysco 600 xmitter or similar gear. Alfred Vasko, 208 Main St., Swanton, Ohio.

FOR SALE — Riders 1-5, guaranteed in perfect cond., $15. W. Gregson, 113 Mott St., New Bedford, Mass.

FOR SALE — Model 520 Telrex Mini-Beam cut for 14.230 kc; heavy duty CDR rotor (4-wire), in the air three months, $60, or beam separately, $40. Joseph Priebe, Rt. 3, Rhinelander, Wis.

FOR SALE — S-38C, $25; two 4D32 tubes, never used, $15 each or both $25; S-O-J, $10. Joseph Ferreira, 1153-F School Ave., Patrick Gardens, Cocoa Beach, Fla.

FOR SALE — Bausch & Lomb standard size 12½" high TL 460 microscope, Achromatic Objectives 10X, 43X in dbl. nosepiece, gives total magnification of 100X and 430X, with hardwood case, $75 FOB. Emil Backstrom, Jr., 6 Pel Pl., Pelham, N. Y.

WANTED — Used SX42 or SX62 Hallicrafter receiver for cash. OK if needs repairs, will call if near. Al Isokait, 41-65 75th St., Elmhurst 73, N. Y.

FOR SALE — 150 Hospital type 6-tube radios with under pillow speakers, bed bracket, coin mechanism, or with lock to operate more profitably by key. Philip S. Carter, 50 Quincy St., Sharon, Mass.

FOR SALE — Superior tube checker TV-11, sacrifice at $25. New York area only. Write Mrs. F. Lauer, Box 8, Lake Ronkonkoma, N. Y.

FOR SALE — Hallicrafters rcvr SX20R, $40; Hallicrafters S53 rcvr, $50. Both perfect operating cond., good tubes. R. Miller, 153 Arbutus Ave., Staten Island 12, N. Y.

WANTED — Good Supreme volt-ohmmeter for model 385 analyzer. State condition and price. L. L. Wilson, 828 Grand Ave., Apt 6, Grand Junction, Colo.

WANTED — Type EL 22 or 22.5 double wave rectifier valves; Presto 125A; X40 Spencer disc recording microscope with extension bracket; RCA 91A communications receiver. John D. Harmer, 192 North Powell Ave., Columbus 4, Ohio.

WANTED — By recently formed ham club, outdated or inoperative TVs, test equip., or what have you, to donate rather than junk. Will pick up in 100 mile radius. Robert Kindell, Mt. Victory, Ohio.

WANTED — Mobile converter for 2 meters and 2-meter mobile xmitter. I have like new transmitting tubes, 4E27, 832, 815, 834, 837, 811, 815, 3C24, 3B24W. Robert Cobaugh, 29-29 213th St., Bayside, 60, N. Y.

FOR SALE — Gardiner code machine, 10 tapes, $15; Carter 6-535 v. dynamotor 135 ma. including relays, mount, and filter, $20; Plymouth 1941-48 auto rcvr, 3 yrs. old, $15. Leigh Robartes, 168 Pine St., Garden City, N. Y.

FOR SALE — Complete 10-meter mobile rig, 6 v. system: Gonset tri-band converter and noise limiter; link transmitter and converter, Premax antenna, and all cables, controls, and mike, $50. A. Potter, 2 Buttonwood Dr., Sayreville, N. J.

TRADE — Philco 17" TV in very good cond.; 24 v. dynamotor, 220 v. DC output; xmitter BC-458A. Need rec., tube tester or ? Karl G. Muck, RFD 2, Warsaw, N. Y.

SELL OR TRADE — Wire recorder with built-in radio and phono, for Johnson Viking Ranger. Richard A. Niglio, 589 Washington Ave., New Haven, Conn.

WANTED — Diagram and instruction book or other info about RCA MI-12235A power amplifier, Serial No. 5402. Alvin Lanford, Station WSPA, Spartanburg, S. C.

FOR SALE — BC-1158 xmtr., RF converted for 144 mc, modulation complete, speech partly wired, complete with four 815 tubes and meter, $24.95; ARC-5 144 mc xmittter, not converted, $19.50. Harry Williams, Pleasant Hill, Mo.

NEED — ARRL Handbooks 1926, 28, 29, 37, 52-55; tape recorder. Have for trade QSTs 1926 to date in binders, also receiving and xmitting tubes. Carl A. McKay, 4144 Meda Pass, Fort Wayne 6, Ind.

WANTED — Osc. coil for BC-348P, 200-500 kc; engraving machine (nameplate); freq. meters, audio and RF; old copies Radio Master before 1950. Slim's, 2025 Sunkist, Waukesha, Wis.

FOR SALE — Knight "In-Circuit" capacitor checker, $10; Heath AR-2 comm. rcvr without cab., good cond., $20; WRL 6L6/807 exciter-xmtr, unused, $20, you pay shipping. Dudney Anderson, 8356 Curzon Ave., Cincinnati 16, Ohio.

FOR SALE — Heathkit: VTVM, V6, $18; signal tracer, T3, $17; condenser checker, C3, $15; and sig. gen., SG7, $15. All exc. cond., with leads and instruction booklets. Hubert Billia, 70 Sherman Ave., Yonkers 5, N. Y.

WANTED — 7JP4 tubes, or stamps. Will trade ham gear, parts, or tubes. Bill Grebe, 518 W. 9th St., Loveland, Calif.

FOR SALE — Schematic of ARC-5 xmitting equip., with parts list, shows all interconnections, complete diagram, 25 cents plus postage. S. Consalvo, 4905 Roanne Dr., Washington 21, D. C.

FOR SALE — 16" GE 20-tube console TV, $22.95, will ship anywhere. Jones Radio, 1115 Rambler Ave., Pottstown, Pa.

WANTED — 30-40 and 152-174 mc mobile rcvr-xmitter equip., also lab test equip. Murray Cohen, 2078 Wallace Avenue, New York 62, N. Y.

SELL OR TRADE — 100 kc crystals, $1; Mallory TV101 UHF converter, $15; Eico 320 sig. gen., $14. R. H. Rogers, 28 Bellamy St., Boston 35, Mass.

WANTED — Heath or Eico color scope and FM tuner. State condition and price. C. Minkin, 110 W. 31st St., Norfolk 4, Va.

WANTED — 3" TV portable or table model need not be in working condition but must be complete. State make, cond., and price. S. Terchanyn, 394 Stone St., Johnstown, Pa.

FOR SALE — DX-100 transmitter, guaranteed to look like factory wired, like new. Eddie Gigliotti, 249 So. Main St., Bangor, Pa.

SELL OR TRADE — Meissner radio-phono disc recorder dual speed, $80, or good tape recorder, dual speed. Also want Gonset Super 6 mobile converter or Gonset 3-30 mc, or similar, for mounting on steering post. Joe Coffield, 1731 West First St., Brooklyn 23, N. Y.

SELL OR TRADE — Tubes: 24G, 15E, 3B28, 715B, 304TL, 803, 810, and 8020. Make offer. H. Hunter, 1106 Carolyn Ave., Columbus 24, Ohio.

WANTED — Complete set of watch repairing tools for cash, or trade Cornet, music course, intercom set. Herbert Horl 418 E. 53rd St., Brooklyn 3, N. Y.

FOR SALE — Altec Lansing 15" duplex speaker 604C with network, mounted in Electro-Voice Regency Klipsch-licensed folded horn enclosure, blonde, excellent condition, $180, metropolitan area. N. Hulemark, 130 75th St., Brooklyn 9, N. Y.

WANTED — "Servicing by Signal Tracing" by John Rider. Shapley Radio-TV Service, 1907 Hendricks Ave., Jacksonville 7, Fla.

TRADE for reflex camera, golf clubs, binoculars, telescope: 2-volt wet cell, 2v vibrator, 829 tubes, 100 and 1000 kcs crystals, 200v dynamotor, Astatic AT-1 booster. J. L. Smith, 4147 Normandy, Dallas, Tex.

TRADE — Complete commercial built amateur radio station 160 thru 200 w, 6 mtrs., on 60' tower and 4 elem. horz. Gonset beam included, value $1,000. Want 16 mm. sound projector and screen. Prefer Pacific Northwest trade. Lee Shields, 1914 Ballinger Road, Seattle, Wash.

FOR SALE — Complete CREI advanced eng. course, exc. cond.; Elements of Acoustical Eng., Olsen; UHF Techniques, Brainerd; Measurement in Radio Eng., Terman. Best offer. J. Scaruffi, 3321 No. Karlov Ave., Chicago 41, Ill.

WANTED — Two 4000 v. DC meters, rectangular or square, 3". H. F. Bates, 10 Beaver Dam Rd., Scituate Harbor, Mass.

FOR SALE — Eico 625 tube tester; 320 sig. gen; 145 sig. tracer; 425 5" scope; Stancor P6415 Isoltran; Century 103 CRT Testivator; Sylvania caddy, TV sets; tubes. Make offer. A. V. Bragg, Box 1, Douglasville, Ga.

FOR SALE — Eico 147 signal tracer, factory wired, $25; Eico 950 condenser checker, $17.50; Hi-Fi phono amplifier (Symphony Hall) 6-8 w. input xtal or mag., output 8 or 16 ohms, $15.. W. Wright, 123 Putnam Ave., Freeport, N. Y.

WANTED — "CQ" Jan., Feb., 1945; U. S. Army tech manuals TM-11-660 to TM 11-682, must be in good cond., state price. A. York, 35 Main St., East Hampton, N. Y.

WANTED — Mobile xmtr, rcvr., all-band, no power supply. George Thompson, 115 South Main St., Doylestown, Pa.

FOR SALE — Auto radios: "Automatic" '55 Ford F-145 6-tube Custom, suppressor parts and antenna, $35; Philco 805 universal mount, $5; WE 24" model 360 cone speaker, $5. C. R. McLaughlin, 801 Kingston Rd., Baltimore 12, Md.

WANTED — Microscope, may be old, but must have standard tube and coarse and fine rack adjustments. J. N. Gilbert, 621 Mississippi Ave., Silver Spring, Md.

WANTED — Hi-Fi wide range speaker such as Jensen, Lansing, EV, Stephens, Wharfdale, in A-1 condition. G. E. Howarth, 216 1st Ave. East, Oskaloosa, Iowa.

WANT — Eldico TR-75; good tape recorder; either 10M, 40M, or 2-meter transmitter above 50 w. input. Trade 1. n. Precise 610 sig. gen.; complete DeForests Electronics course. J. C. Stephens, 37 Blandys Court, Rockville, Md.

WANTED — 465 mc equipment, transmitter, rcvr., frequency meter, antenna, and 2 Abbott TR-4 transceivers in good shape. Electronic Service, 4918 Beech St., Hammond, Ind.

WANTED — S.S.B. Sig. Slicer; small table or bench model printing press with type. Will pay cash or trade commercial TV service equip. Franks TV Service, 715 Broadway, Bedford, Ohio.

WANTED — Rider's TV Vol. 14, state condition and price. C. H. Rieth, R.D. 4, Troy, N. Y.

WANTED — Heathkit (or similar) FM tuner, assembled and aligned. State price, postpaid. R. C. Barley, 124 W. 8th St., Plainfield, N. J.

FOR SALE — Hallicrafters S-19-R Sky Buddy comm. rcvr, A-1 cond.; Heath VF-1 VFO unused; 1927 Aerodyn radio, exc. cond. Make offer. John Strazza, Jr., 48 Pulaski St., Bloomfield, N. J.

FOR SALE — Revere 8 mm movie camera, $35; Hallicrafters S-38, very good cond., for best offer over $25. W. C. Gutermuth, 807 Mechanic St., Jeffersonville, Ind.

WANTED — NRI radio course. State price, condition, age. Thomas G. Field, 459 Forest Circle, So. Charleston 3, W. Va.

FOR SALE — Latest VM model 710 Hi-Fi tape recorder in orig. box, pre-recorded tape, accessories, registry card included. Best offer. H. K. Trost, 839 Seward St., Rochester 11, N. Y.

FOR SALE — NRI complete Radio-TV course, complete kits for building multi-tester; 6-tube superhet rec. Nothing used, opened only for inspection, $75. John G. Miller, Sheffield Apts, Pawling, N. Y.

WANT — Good commercial rcvr, NC, HQ, or SX, etc., need not be in working condition. Will swap xmitters. Bob Pohorence, 36 Orchard St., Yonkers, N. Y.

FOR SALE — Lysco 600G Transmaster with lo-pass filter and phase modulator, no TVI, 160-10 meters, $70; General Radio Variac 2 KVA, 115 v., 60 cy., single phase, 18 A, type 100-Q, $30. Gene Reynolds, 4063 Lasher Rd., Drexel Hill, Pa.

SWAP — Meissner 8C FM tuner, 1. n., walnut cabinet, for converter for auto radio to receive marine band and short wave. Stanley Buckwalter, 61-41 Saunders St., Rego Park 74, N. Y.

SELL OR TRADE — GE 250 portable, needs battery and vibrator; Chevrolet 1941-48 radios. Want 6-12 v. battery eliminator, 1949 DeSoto radio, VTVM. Edward J. Simek, 1124 4th St., Devils Lake, N. D.

FOR SALE — RCP 777 signal tracer, used very little, $20 express collect. Rupert Freeman, 2108-33rd Ave., Meridian, Miss.

FOR SALE — Over 1000 good used radio and TV tubes, all numbers old to present types, 7½ cents each, for the lot or make offer. William H. Henshaw, 46 Front St., Tarrytown, N. Y.

FOR SALE — UHF G.I. tuners, like new. Best offer. ACA Television Center, 1111 East Elizabeth Ave., Linden, N. J.

WANTED — Glass dial for RCA K130 all-wave radio. Charles H. Godfrey, 3 South Clinton St., Poughkeepsie, N. Y.

FOR SALE — Eico 25 oscilloscope 5", push-pull, good condition, $35; Clough-Brengle oscillator, model OC, good condition, $15. Pioneer Radio Co., 129 Woodlawn Ave., Yonkers 4, N. Y.

FOR SALE — Spring-wound Instructograph code machine, built-in oscillator, key, phone; Ameco 1&4 adv. records course to 18WPM, all for $30 FOB. Edward J. Daley, Peterson Rd., Rockville, Vernon Center, Conn.

WANTED — 80 meter phone and 40 meter phone coil (3 to a set) for Meissner Deluxe signal shifter (VFO). J. Brody, 8565 Fayette St., Philadelphia 50, Pa.

SWAP — BC-654A, ARC-4 transceiver, PE-104 pwr supply; radar xmtrs T-39/APQ-9 and T-26/APT-2; radar receiver APR-2. Want photo, ham or Hi-Fi gear. Jack Barnes, 321 River Rd., Nutley, N. J.

WANTED — 3-pole DT HV SW from BC-906 or 906D; Eimac 4-400A tube; sealed 6hy @ 500 ma choke; CQ Feb. '54. C. Borysevich, 1066 President St., Brooklyn 25, N. Y.

FOR SALE — 2-meter beam — Skysweeper 5 over 5, like new, coax termination, $10; radio cabinets for DeForest-DeVry training; AC-DC radio kit (4-knob chassis), custom made, ultra-modern, mahogany, blond. H. Grove, 4103 W. Belmont Ave., Chicago 41, Ill.

SALE OR SWAP — Over 100 copies IRE Proceedings. Best offer plus postage. H. Rochkind, Box 747, Westport, Conn.

FOR SALE — Mobile 6 v., 10 w., 152-162 mc xmitter-rcvr, complete with mike, antenna, and cables, less xtal. Bill Dore, 464 Jericho Tpk., Mineola, N. Y.

WANTED — 2-meter mobile rcvr; 8 mm movie projector. Have Kelsey 9 x 13 printing press. Clyde Keeler, 66 Franklin St., Port Jervis, N. Y.

SELL OR TRADE — Eico 425K oscilloscope, never used, Hickok 530 tube tester, eliminator, signal tracer, VTVM Heathkit. Want late model tube checker. Prefer local trade. J. Rennert, 238 Vivien Ct., Paramus, N. J.

FOR SALE — Eicor tape recorder, on sale, $59; 5 x 50 binoculars, $7; Polaroid 95 camera with case, $50. J. Madden, 351 W. 44th St., New York 36, N. Y.

FOR SALE — Heath test equip., excellent cond.; 08 scope; AC meter; electronic switch; RF signal generator; probes; demodulators. $80 for lot. S. D. Kaufman, 68 Marshal St., Brookline, Mass.

WANTED — Surplus BC-348 receiver, state cond., price. Also 8000 ohm impedance headphones with Bi-Polar magnets, complete; QST and CQ back issues. Eldon O'Neil, 52 Backman, Westfield, N. Y.

FOR SALE — Emerson pocket portable radio-receiver, model 747, perf. cond., $15. R. Langlois, 1448 Randall Ct., Los Angeles 65, Calif.

FOR SALE — Rek-O-Kut TR-12-H recording and playback turntable with M-12 overhead cutting mechanism, top notch condition, $90, or best offer; Bogen DB-20 amp., Hi-Fi, $50. A. H. Arkus, 217-07 75th Ave., Bayside 64, N. Y.

SWAP OR SELL — SCR-522 transceiver unmodified complete with conversion manuals, for cash or tape or wire recorder. Dick Platt, Box 234, Summerland, Calif.

FOR SALE—Test equipment, parts, books; CIRE TV Engineering course; Bogen Hi-Fi amplifier. Ralph Peterson, 42 Clark St., RD 4, Library, Pa.

WANTED — Heathkit AT-1, reasonable. Will sell or trade NC-101X receiver for newer receiver. Darrel Richards, 373 University Village, Minneapolis, Minn.

TRADE — Boys 26" bicycle with extras (cost $50) and little used Whizzer gas motor for bike (cost $130), for ham gear, test equip, etc. Bob Farmer, Plainview, Tex.

WANTED — Large invertor in fair condition, input 6 v. DC, output 110 AC, power rating of not less than 150 w. Wayne Sines, R. 1, Box 425, Oakland, Md.

FOR SALE — DX-100 modified for blocked-grid break-in keying; homemade version of RCA TK-20A film camera video amp., with 200 mill voltage reg. supply, will pass 8 mc. E. Campaine, 4010 South Renellie Dr., Tampa, Fla.

FOR SALE — Factory made model 526 Eico multimeter, $10 plus postage. Dominick Colabella, 23 Congress St., New Rochelle, N. Y.

FOR SALE — Eico 625 tube tester, $35, and 566 multimeter, $15; Hallicrafters S38D receiver, $35; also 10BP4 pix tube to give away, weak but usable, you pay shipping. John A. Kerin, 1250 Perrot St., Green Bay, Wis.

WANTED — Good Leece-Neville 6 v. alternator with voltage regulator and rectifier. Prefer high current unit. Saul Smolar, 1220 Grand Concourse, Bronx 56, N. Y.

WANTED — Transistorized metal detector or plans for same; binoculars. Have LM13 freq. meter and RCA 1" scope, etc. C. Hackenson, 343 Mansfield St., Sharon, Mass.

FOR SALE—Handmade African mahogany 45" cabinet with Browning AM-FM tuner, amp and pre-amp, 2-speed motor, balanced arm GE reluctance heads, $75. Will sell cabinet only. Local only. R. A. Picard, 48 East 43rd St., New York.

SWAP — Deltronic 2-meter xmitter and receiver; Eico Geiger counter; Precision ES500 scope; 752 Stancor eliminator. Need ham gear. C. E. Twining, Box 337, Trona, Calif.

WANTED — For Majestic radio model No. 12FM 475: two BC RF and SW RF coils, one unit No. 3 - 186 and two BC osc. and SW osc. coils, one unit, No. 3 - 171. Thomas Lusher, 1815 7th Ave., Charleston, W. Va.

FOR SALE — Heathkit 7 w. amp. A-7E assembled but unused, $18.50 postpaid. G. J. Reichert, 4833 Upton Avenue South. Minneapolis, Minn.

FOR SALE — Electronic Body Capacity Burglar Alarm system, like new, manufactured by American Research Products. $90. M. Dean, Box 185, Sorrento, Fla.

TRADE — DeVry scope, frequency range up to 50 kw, for anything valued at $30, books or instruments. David Ruther. 2546 Coutee Street, Shawinigan Falls. Quebec, Canada.

WANTED — Mobile radio gear, RF wattmeter, modulation meter. Have 20" wall fan; Warner photo cell alarm, Eico Geiger counter. J. J. Mueller, Manchester Depot, Vt.

SWAP — Masco 2-speed (33⅓-78) recorder and playback, portable case, complete with mike, for Army R-100 all-wave receiver, A-1 shape. George Novak, 5036 So. Kildare Ave., Chicago 32, Ill.

TRADE OR SELL — General Radio 583A output power meter, operating instructions, good condition. Joseph Marcano, 946 E. 167th St., Bronx 59, N. Y.

FOR SALE — Heath AT-1 xmtr and AC-1 antenna coupler; pair 810's. Excellent condition, $40 takes all. B. Greenstone, 285 Warrington Dr., Rochester 18, N. Y.

SELL OR TRADE — Sylvania X-7018 modulation meter, $10; RCA Faradon ceramic-cased high-power broadcast mica transmitting condensers .0015 at 8,000 volts, $10 each or trade. H. W. Lingenfelter, 21352 Kenwood Ave., Rocky River 16, Ohio.

WANTED — RCA TV Pict-O-Guide, Vol. I and Pix-O-Fix. State price and cond. Edward Ruditys, Story Rd., Twin Oaks, Box 468, Chester, Pa.

WANTED — Viking II, factory wired. State condition and price. Jim Higgins, 307 Wayne St., Highland Park, N. J.

FOR SALE — Philco tube tester 7050, exc. cond.; AEI sig. gen., model A-200, never used; Jr. Super meter, good; also tubes, condensers, resistors, and relays. Make offer. Edward Svoboda, Box 160, Wilber, Neb.

SELL OR SWAP — Automatic phono 78 rpm, $6; Armature tester, l. n., $13.50; Motorola AM-FM radio, $18; Detrola rcvr, $10; 33⅓ rpm phono, l. n., $5. Robert Gelnett, R. 2, Liverpool, Pa.

WANTED — Two-way car radio citizen's band, for 12 v. car (battery); two-way radio citizen's band for 110-120 v. AC. Must be reasonable. Lee's Electronics Service, Henagar, Ala.

FOR SALE — Eico 425 oscilloscope, $35; Eico 315 sig. gen., $25; Zenith 4C21 phono-record demonstrator, needs repair, $35. H. Bell, 3917 Ely Ave., Bronx 66, N. Y.

FOR SALE — 3-30 mc. Gonset converter, $25. Donald Thompson, 3321 Normandy Rd., Springfield, Ill.

FOR SALE — RCA model ET 8011-A, serial No. 3995, near perf. cond., any reasonable offer. P. M. Read, 1033 Elmwood Ave., Sharon Hill, Pa.

ATTENTION — West Coast Servicemen: All Sams Photofact folders complete on Hoffman, Packard Bell, etc., 50 cents plus postage. R. C. Radio & TV, 2517 Pitkin Ave., Brooklyn 8, N. Y.

FOR SALE — Cabinets with chassis, with all parts except tubes, 7, 10, 12" sets. Make offer. Hal Blackman,, 8333 South Drexel Ave., Chicago, Ill.

FOR SALE — Regency RC600 and Mallory 188 UHF converters, or swap for anything of equal value. William A. Borras, 438 Laroussini St., Westwego, La.

SELL OR TRADE — CREI courses: Sections 1, 2, and 5; NRI Communications course with or without kits; DeForest's course, less kits. Want ham gear, tape recorder, test equip., camera-projector, 4-speed phono. J. H. Goode, 1817 W. Octave, Pasco, Wash.

FOR SALE — GE multitester model Unimeter UM3, $20; Simpson 286 AC voltmeter, 5-1000 v. AC, never used, $7.50; Gilson Iron-O-Meter, l. n., to repair electric irons and thermostats, $17.50. M. Georgion, 1684 Grand Concourse, New York 57, N. Y.

WANTED — TV field strength meter. Cash or trade. George Epstein, 200-27 46th Ave., Bayside, N. Y.

WANTED — Low power all-band CW and phone transmitter, cheap for cash. E. Damon, Box 142, Bingham, Maine.

WANTED — Portable leatherette case for 7" Motorola model VT73. State price and cond. Wilbur Remley, R. 6, Box 370, Decatur, Ill.

WANTED — Swap or cash for complete Christy Trade School Radio, TV, Radar, Sonar correspondence course with or without kits or material. Recent issues preferred. W. Brogan, 306 Bethlehem Pike, Ambler, Pa.

FOR SALE — Mobile FM receiver 6 v. crystal controlled 30-50 mc, demonstrator model, single frequency, $55, complete set for 39.90 mcs. Bill Ryan, 15 Lincoln Ave., Havertown, Pa.

FOR SALE — Eico radio and TV test equipment, like new, reasonable: VTVM, VOM, CRT checker, battery eliminator, probes, RCL bridge, sig. generator, sig. tracer, etc. Frank Idoni, 216 Fir St., Valley Stream, N. Y.

SELL OR TRADE — 35 mm Durst Reporter Enlarger; Heiland VII Strobe unit; 1956 Exakta VX camera, f1.9 lens. Can use power tools or Hi-Fi equipment. R. H. Safford, 3837 Waterbury Dr., Dayton 9, Ohio.

FOR SALE — Like new Century model 201 condenser and resistor analyzer, $12.50. Dick Pannhoff, R. 2, Forest City, Iowa.

SALE — Hickok 620 Cross Hatch generator; 2 Sylvania tube caddies; Riders manuals 1 to 17 complete. Make offer. Dale P. Smith, 2840 Potter St., Eugene, Ore.

WANTED — Vol. 1 to Vol. 20, any or all issues C-D Capacitors, reasonably priced or state needs for swap. R. E. Jones, 713 Front St., Catasauqua, Pa.

FOR SALE — Simpson 335 tube tester, used slightly; and 480 Genescope, like new condition, both reasonably priced. E. Nodosy, 9701 S. Francisco Ave., Chicago 42, Ill.

SELL OR SWAP — Precision model 85 voltmeter, 20,000 ohms per volt, $20; GE magnetic cartridge with .001 diamond stylus, $12; Webco 210 recording heads and misc. meters. S. Wellenc, 256 12th Ave., No. Tonawanda, N. Y.

WANTED — RCA audio chanalyst 170-A. State serial number and condition. Bill Neilson, 587 S. Bascom St., San Jose 28, Calif.

WANTED — Hallicrafters T-54 TV rcvr, cabinet in good cond. State price and condition. Neil E. Berg, 1111 3rd St. South, Moorhead, Minn.

SELL OR SWAP — Edison cylinder phonorecorder; Webster wire recorder, Vibroplex bug; 4-805 xmtr tubes. What have you? F. L. Martini, 306 S. Buchanan, Edwardsville, Ill.

WANTED — Used code course on 78 rpm records. State condition and price. Earl C. Kirk, Jr., 108 So. Marquette Ave., LaPorte, Ind.

SELL OR TRADE — RME-69 with DB-22A preselector; Sams Photofact 1 to 8, plus odd folders; Weston 798 tube tester. All for $275, or trade for Collins 75A2 rcvr. Ira A. Smith, Jr., Box 1829, Asheville, N. C.

SWAP — McMurdo-Silver model 800 HF receiver for 144/148 and 235/240 mc bands. Want VFO with power supply. Charles Stouth, Box 44, King of Prussia, Pa.

FOR SALE — Riders manuals 1 to 12, perf. cond., $50; C-D Capacitor analyzer BF50, $20; signal generator E200, $15. Frank Cresswell, 48 College Ave., Tarrytown, N. Y.

WANTED — Schematic for Sprayberry multimeter, 1953 model. State price. Edward Mandich, 306 Chicora St., East McKeesport, Pa.

FOR SALE — Going FM: 6-meter mobile station — Harristahl Labs. xmitter, converter for auto radio and 12 v. dynamotor, all shock mounted on rack; Hallicrafters S-20R with 6-meter converter. All for $125. Will ship. P. L. Lewis, 416 Philadelphia Avenue, Egg Harbor, N. J.

SELL OR SWAP — Collins 7C audio amplifier in cabinet, pair 203's output self-contained power supply. Class B amp pair 203A's on chassis to match above 7C. All tubes. Want Central Electronics 20A. E. L. Tovrea, 303 W. Saunders, Mt. Pleasant, Iowa.

FOR SALE — 17" professional disc recording lathe, $90; Rek-O-Kut model 205 lathe, $40; unused audiodiscs and audiopoints at sacrifice; type 100-R variac, l.n., $45. Want tape recorder. John T. Moore, Box 63, Seneca, S. C.

FOR SALE — Hickok 610 sweep gen.; Transvision field strength meter; WE 110 AC to 110 DC rectifier, $10; TBS-50 cabinet 21 x 15 x 14, $4. Want Mon-Key. Hopper's Radio & TV Shop, 301 Hollis St., Framingham, Mass.

WANTED — Instruction manual for Lee TV Serviset to buy or rent; Knight VTVM or Eico 565 or 555 multimeter; Knight or Century capacitor-resistor tester. State condition and price. Leo Adas, 1842 No. Keystone Ave., Chicago 39, Ill.

SELL OR SWAP — For 6 or 10-meter rig, 100 w. 80 m. xmtr, $50; rcvr AR-2 with BC-453, $30; Bogen intercom, $5; 45 rpm changer, $10; 6R12 modulator, $10, etc. Earl Schrader, 4448 Clinton Ave. So., Minneapolis 9, Minn.

FOR SALE — Unused inverters: ATR-ISP-32DC to 110AC 150 w.; ATR-RSC-110DC to 110AC 250 w.; Electronic Lab. RV15 32DC to 110AC 150 w. Choice $10 FOB. Ray W. Jordan, Rt. 1, Detroit Lakes, Minn.

WANTED — Mims signal squirter, rotary beam indicator, or instruction manual. Will pay cash or trade. J. Allen Call, 616 Colorado St., Salt Lake City, Utah.

TRADE — Unused Electro-Voice model 606 differential dynamic mike and GE photo-electric relay. Need VTVM or VOM. E. A. DeCobert, Jr., 609 Henrietta St., Gillespie, Ill.

WANTED — Good 8BP4 tube, reasonable. Vincent R. Valley, 4318 Banks St., New Orleans 19, La.

SELL — 7JP4, $3; 2-892B, $4; radio-phono in good cond., $5. J. Nohe, Jr., 4026 Lyndale Ave., Baltimore 13, Md.

SELL OR TRADE — Old radio parts, coils, tubes, loudspeakers, etc. Neil's Radio & TV Service, 308 Crawford Terrace, Union, N. J.

WANT — Test equip., cheap. State make, model, age, cond., and cash price. R. B. Johnson, 3922 W. 108 St., Inglewood, Calif.

FOR SALE — Heathkit Q multiplier, fully assembled, never used, $9 or apply on trade for inexpensive 3-speed record player. B. J. Watkins, 1803 Peninsular, R. 2, New Smyrna Beach, Fla.

FOR SALE — DC power supply for transmitter, out, 0-2,000 v. DC, 300 ma, input 115 v. AC, double L-type filtering, 10A filament supply, output volt and amp. meters. Best offer over $49. Richard Monaco, 53-38-69th St., Maspeth 78, N. Y.

FOR SALE — High gain UHF TV boosters, use pair 6AN4 grounded grid triodes, AC powered with transformer, attractive plastic cabinet, $15 each, $10 each for six or more. Fletcher & Smartt, 1351 Willamette St., Eugene, Ore.

WANTED — Early radio books, magazines, catalogs, pictures, callbooks, government documents, etc. Have some duplicates to trade. R. Birren, 702 Spring Rd., Elmhurst, Ill.

WANTED — University Tweeter with matching crossover network: 4401 with 4405, 4408 with 4410, 4402 with 4420. State age, condition, and price. M. Ferenc, 43 Hudson St., Garfield, N. J.

SELL OR TRADE — Sprague KT-1 capacitor checker for in circuits test. Best offer over $10 or trade. Will ship anywhere. Joe Villella, Cooperstown, N. D.

FOR SALE — McMurdo-Silver 904 bridge; Sprague KT-1; Sylvania 134 Polymeter and 140 tube tester; Heathkit bar gen. BG-1. All with schematics and operating instructions, perf. cond., sell to best offer. C. B. Davis, 2276 Brookforest Dr. NE, Atlanta, Ga.

FOR SALE — Electro-Voice model 636 "Slimaire" dynamic mike, $32. M. G. Weiman, 4514 Ave. K, Brooklyn 34, N. Y.

FOR SALE — SX-99 Hallicrafter receiver W/R-46A matching speaker, like new, $125 or best offer. Will deliver within 100 miles of NYC. Capt. W. E. Patterson, 123 Arlo Rd., Staten Island 1, N. Y.

FOR SALE — Knight VTVM, very good cond., 4½" meter, 200 microamp movement, zero center scale and direct reading decibel scale, input resistance 11 megohms, $15. Prefer local. Jack P. Jowe, 663 Peralta Ave., San Francisco 10, Calif.

WANTED — TV-X-106 horizontal output transformer. State price. Walter W. Ellett, 10111 Scenic Blvd., Cupertino, Calif.

FOR SALE — Police Alarm PR31, 30-50 mc, $49.95; Monitoradio DR200 30-50 mc and 152-174 mc FM with matching speaker, with squelch, $164.90; Monitoradio 12 v. mobile receiver 30-50 mc, $99.50. All like new. G. D. Griffin, Box 343, Ithaca, N. Y.

TRADE — Collectors' item like new model 10 Atwater-Kent batt. radio, 33 years old; Triplett 2432 sig. generator, 75 kc to 50 mc. Want small scope or VTVM. Local only. C. Wagner, 13107 Kirton Ave., Cleveland 11, Ohio.

WANT — To buy complete copyrighted Radio or Radio and TV correspondence course. C. L. Bangert, 808 East Sixth St., Ocala, Fla.

WANTED — To contact anyone with information or ideas on the "color organ" which produces flowing colored lights in response to music. William J. Kiewel, Station KROX, Crookston, Minn.

WANTED — Strobeconn for tuning and Strobetuner for cash or will trade tube tester. Want Wurlitzer piano rolls, cash or trade Hammeter. Tele-Set Service Shop, T. E. Champion, 669 Swan St., Terre Haute, Ind.

FOR SALE — BC-924-A xmitter, less VFO, 27.0 - 38.9 mc FM, with DM-65-A dynamotor (12 v. in.), shock mounted rack, control head, cables for mobile installation. Ideal for 10-meter conversion. Best offer over $60. Monroe Bean, Hollis Center, Maine.

FOR SALE — Heath TV alignment gen., l. n., with all cables and xtal, $40; 12" EM speaker, $5. Want 50 mc equipment and good communication receiver. Dick Pfouts, Mt. Victory, Ohio.

FOR SALE — Riders TV manuals 1 to 7, exc. cond., $65. Bill Wapniak, 889 Hunts Point Ave., Bronx 49, N. Y.

FOR SALE — Unused Weston 983 color oscilloscope. Best cash offer over $175. Charles Garrett, 189 Howard St., New London, Conn.

SELL OR TRADE — Philco 2" scope, $30; Webcor 180-1 recorder, $50; 8TS30, $60; 630 chassis, $25; Federal portable enlarger and accessories, $80. Want tape recorder, binoculars, 8 mm movie equipment. G. H. White, 449 Wellington Rd., Mineola, L. I., N. Y.

FOR SALE — National model HFS receiver 27-250 mc.; Heath model T2 sig. tracer; McMurdo-Silver 906 signal gen.; Sams Photofacts 1-60; BC-733D receiver. All good condition, FOB. William Huhn, Jr., RD 4, Quakertown, Pa.

FOR SALE — Jackson 103 tube checker, A-1 condition, new roll chart and supplement sheets, $25 plus postage. J. H. McHocko, 205 South 11th St., Easton, Pa.

FOR SALE — Great and Swell 60 note triple stacked shunt keying mechanisms, two complete sets of tone generators, bought from Minshall Electronic Organ Co., April, 1956, never used, $35 FOB. M. W. Driskell, 407 Lauderdale St., Selma, Ala.

POSITION WANTED — Electron microscopist with chemical background in ultrafine pigments. New York City area. Available immediately. Resume on request. Warren C. Goodrich, 25-12 Union St., Flushing 54, N. Y.

WANTED — Used, in good shape and complete, No. 1 to latest Photofact folder sets. What have you? Price? Courcy's Electronics, 15 Garfield St., Taunton, Mass.

WANTED — RME 53, 2, 6, 10, 6 v. converter or equivalent. Cash, swap or trade. G. A. Hewitt, 243 Monroe St., Brooklyn, N. Y.

FOR SALE — 10 years of "Electronics" practically complete, $15. Harry E. Fullam, 36 Midland Ave., White Plains, N. Y.

WANTED — Rek-O-Kut or similar type overhead recording lathe with or without accessories. Frank Brandenburg, R. 1, Burlington, N. C.

FOR SALE — Capacity Relay Burglar Alarm, operates by body-capacity, bell and flashing light alarm, key lock switch, never used, $30 FOB. J. M. Hirschinger, 417 Hampshire St., Quincy, Ill.

SELL — VFO, part of English xmitter No. 53, 1.2 to 17.5 mc in 4 bands, provision for 4 crystal positions, with schematic, $30 FOB New York. Walter A. Tilleman, Bendix Radio Dept. 474, Baltimore 9, Md.

FOR SALE — Ampex 600 tape recorder and 620 companion piece, used very little, both for $575; Midgetape pocket tape recorder, still under factory warranty, $169; Fisher FM 80 tuner, spotless, $95. Philip Lance, Greenwich, N. J.

FOR SALE — Hallicrafters S-38-D, like new, $30. Paul Cohen, 1325 Rosedale Ave., Bronx 72, N. Y.

SWAP — SX28A, like new cabinet and rack mount cabinet, recently factory overhauled, for Hi-Fi speaker system of equivalent value. Clifford Storch, 5 Winfield Terr., Great Neck, N. Y.

SWAP — 12-volt set of Audel's New Electric Library; DB-23 preselector; B & W T-R switch; all very little used. Want ham mobile gear in good cond. Henry C. Jung, 213 N. Tenth St., Philadelphia 7, Pa.

FOR SALE — NRI Radio and TV course, complete, like new, $25. Ace Electric Co., Monticello, N. Y.

FOR SALE — Rack mounted 522 xmitter, BC-639 rcvr, speaker and power supplies, 4 ft. enclosed cabinet; 10-meter mobile xmitter, 2E26 final; Hallicrafters S55 AM-FM tuner. All in good cond. R. L. Godwin, 56 N. Longbeach Ave., Freeport, N. Y.

FOR SALE — NRI advanced TV course, kits and manuals. Don Meek, 210 North Rock, Sheridan, Ark.

FOR SALE — Pair Vocaline JRC-400 110 v. AC-6 v. DC Citizens radio transceivers with GP-4 ground plane antenna, $85; also Hi-Fi equip. Richard Ebeling, 33 Randolph Rd., White Plains, N. Y.

SELL — QST from 1945; Electronics, 1949; Proc. IRE, 1952; Philco TechRep Bull., 1951; Signal, 1950; Fortune, 1950; Nucleonics, 1952; Electrical Communication, 1945. Mostly complete, exc. Make offer. D. Smith, 5419 56 Place, Riverdale, Md.

WANTED — Radioteletype publications, information, equip., CQ and QST containing RTTY articles. Will swap telephone repeater parts, toroids, hybrid coils, relays, Bell Lab. monographs. Fred Hatfield, Box 7530A, L. S. U., Baton Rouge, La.

SELL OR TRADE — Wilcox-Gay disc recorder for good 5" oscilloscope. Overstock of 37 and RK60 tubes to trade or sell. Charles Broy, Frakes, Ky.

FOR SALE — Hallicrafters model S86, $60; Silvertone wire recording unit, $15; 45 w. PA with remote control, decibel meter, 2 speakers, mike, changer, $100. J. Bozovsky, 4503 N. Kenneth Ave., Chicago 30, Ill.

WANTED — Emerson TV, model 1030D or 1032D. Cash or trade TV instruments. P. Ferrina, 4309 Kansas Avenue NW, Washington 11, D. C.

SELL OR SWAP — Stancor ST-202-A transmitter, 125 w., with external PP807 plate modulator, $100, or swap for other transmitter. Charles E. Rich, Box 12, Littlestown, Pa.

WANTED — RCA Demonstrator Board. State price. Buffalo Radio Institute of the YMCA, 45 West Mohawk St., Buffalo 2, N. Y.

WANTED — "Servicing by Signal Tracing" by John Rider; Hickok AM sig. gen. State condition and price. S. Pentland, 23 Orchard St., Canajoharie, N. Y.

TRADE — 5 x 8 Kelsey hand printing press with all equipment and type, for electronic test equipment. F. Santiago, Jr., 769 Bryant Ave., New York 59, N. Y.

SELL OR SWAP — Radio tubes and parts for U. S. or foreign stamps. List for stamped envelope. R. Odell, 502-12th St., Tell City, Ind.

FOR SALE — Latest model EMC 206 mutual conductance tube tester in oak carrying case with TV picture tube adaptor, counter demonstration use only. Best offer, prepaid. Sonoret Tele-Radio Co., 36 Woodbury St., Wilkes-Barre, Pa.

WANTED — Sams Photofacts. State price and condition. W. C. Wayman, 1329 E. Court St., Beatrice, Neb.

FOR SALE — Bogen DB-20 Hi-Fi amplifier with cover, A-1 $65. Charles W. Leigh, 162 Passaic St., Trenton 8, N. J.

FOR SALE — Heathkit AR-3 comm. rcvr, with cabinet and instructions, A-1 cond., aligned and tested, $25. Richard Sparks, 460 Vermont Ave., Dinuba, Calif.

FOR SALE — Collins 30K-1 transmitter in good condition, $500 FOB. R. L. Petry, Sewanee, Tenn.

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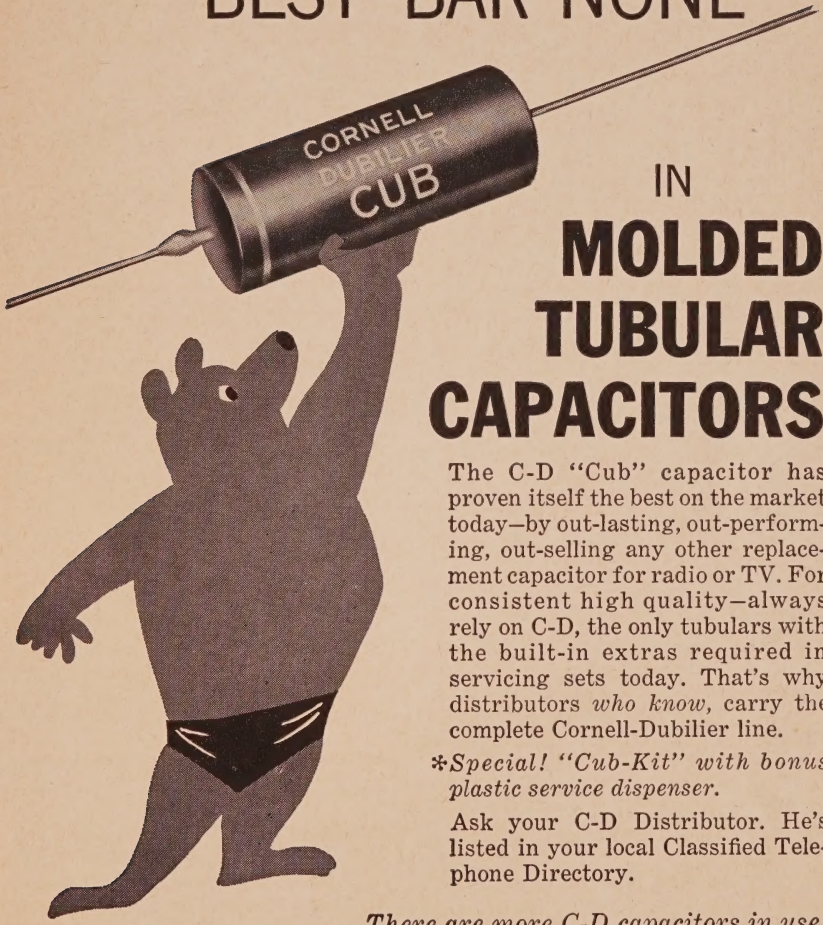

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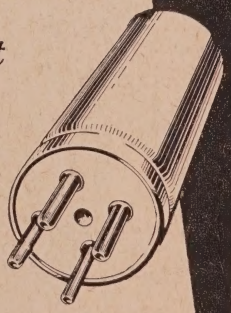

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